REMARKS

Present Status of the Application

The Office Action indicates that the title of the invention is not descriptive and a new title is required. The drawing are objected under 37 CFR 1.83 (a). Claims 4, 7, 8 and 25 are rejected under 35 U.S.C. 112, second paragraph. Claims 1, 2, 5-8, 18-24 and 26, insofar as claims 7 and 8 can be understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Degani et al. (US Patent No. 5,646,828). Claims 3, 4 and 25, insofar as claims 4 and 25 can be understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Degani et al. (US Patent No. 5,646,828) in view of Osedo (Japan Patent No. 3-187227A).

Applicant has amended the title of the invention to clearly indicative of the invention, and has amended claims 1, 4, 7, 25 and 26 to improve clarity. After entry the forgoing amendment, claims 1-8, and 18-26 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Discussion of Objections under 37 CFR 1.83 (a)

According to the Office Action, the drawings are objected under 37 CFR 1.83 (a) because the drawings do not show the feature "the heat spreader is plated with gold" in claims 4 and 25. Applicant respectfully traverses the objection for at least the reasons set forth below.

The conventional plating process is a surface treatment to form a very thin layer on a

surface of an object. In the present invention, the plating process is used to forming a very thin gold layer on a surface of the heat spreader. **Since the plating process is a kind of surface treatment, the thin gold layer plated on the surface of the heat spreader can be viewed as a portion of the surface of the heat spreader, or combined onto the surface of the heat spreader.** Therefore, there is no need to amend the drawings to show the feature: "the surface of the heat spreader is plated with gold" in claims 4 and 25, as amended. Accordingly, Applicant respectfully submits that the objection has been overcome and should be withdrawn.

Discussion of Rejections under 35 U.S.C. 112

The Office Action rejects that claims 4, 7, 8 and 25 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which applicant regards as the invention. Applicant respectfully traverses the rejections for at least the reasons set forth below.

According to the above discussion about the objection of the drawings, if the drawings are not necessary to be amended to include the feature: "the thin gold layer plated on the surface of the heat spreader" in claims 4 and 25, the rejection to claims 4 and 25 should be withdrawn.

Besides, please refer to claim 7, as amended, as follows.

7. The MCM package of claim 1, wherein the first chip further comprises a ground contact and the second bumps comprises a ground bump.

Applicant has amended claim 7 to improve clarity by adding the phrase "first" underlined and, the rejection to claim 7, as amended, should be withdrawn. Consequently, the rejection to claim 8, dependent on claim 7, should also be withdrawn as a mater of law.

Discussion of Rejections under 35 U.S.C. 102(b)

The Office Action rejects Claim 1, 2, 5-8, 18-24 and 26, insofar as claims 7 and 8 can be understood, under 35 U.S.C. 102(b) as being anticipated by Degani et al. (US Patent No. 5,646,828). Applicant respectfully traverses the rejections for at least the reasons set forth below.

The independent claim 1 recites as follows.

1. A multi-chip module (MCM) package, comprising:
a substrate having an opening therein;
a plurality of first bumps;
a first chip that has an active surface bonded to and electrically connected with the substrate through the first bumps, the active surface of the first chip facing the opening of the substrate;
a plurality of second bumps;
at least one second chip disposed in the opening of the substrate and bonded to the active surface of the first chip through the second bumps, the second chip being electrically connected to the first chip through the second bumps; and
at least one heat spreader without signal transmission functions disposed in the opening of the substrate and bonded to the active surface of the first chip.

(Emphases added)

The claim invention provides a heat spreader to increase the efficiency of thermal dissipation in the MCM package. The heat spreader has no signal functions without any semiconductor integrated circuit (IC) thereon, while the first chip and the second chip are semiconductor integrated circuit (IC) chips and both have active devices thereon. Therefore, the heat spreader is not any one IC chip of multi-chip module (MCM) but stacked on one IC chip of multi-chip module (MCM).

Degani et al., in Fig. 1 column 4 lines 46-49, disclose a silicon-on-silicon MCM title (17) in a MCM package (10) is consisted of a silicon substrate (18) and a plurality of chips (19) and (20). Degani et al., in Fig. 1 column 4 lines 50-52, further disclose that **wirebond fingers (21) on the silicon substrate (18) are interconnected via wires (22) to contact pads 23 on the middle level of the PWB (11).** However, the present invention, in Fig. 2 paragraph [0028] lines 3-5, discloses that **the chip (230)** ***(i.e. silicon substrate (18) in Degani et al.)*** **is bonded to and electrically connected with the substrate (210)** ***(i.e. PWB (11) in Degani et al.)*** **through bumps (280) that are disposed between the contact pads (234) of the chip (230) and the contact pads (216) of the substrate (210).** Therefore, Degani et al., in Fig. 1, does not disclose that the bumps (280) of the present invention for electrically connecting the silicon substrate (18) to the PWB (11). Similarly, Degani et al., in Figs. 2-5, disclose the wires (22)

electrically connecting the silicon substrate (18) and the PWB (36 in Figs. 2-3; 46 in Figs. 4-5), but does not disclose the bumps (280) in the present invention.

Although Degani et al., in Figs. 6-8, disclose the bump (74) between the silicon substrate (18) and the PWB (61 in Fig. 6; 71 in Fig. 7; 71 in Fig.8), **Degani et al. teach the thermal dissipation solution by using a structural member (65)** (Fig. 6, column 7 lines 7-12), **or a cup-like cover** (Figs. 7-8, column 7 lines 38-44) **attached to the backside of the substrate (18), but not attached to the active surface of the substrate (18)**. However, **the present invention**, in Fig. 2 paragraph [0030] lines 1-6, **teaches that the heat spreader (270) is disposed on the active surface (232) of the chip (230) but not disposed on the backside of the chip (230), and is bonded to the active surface (232) of the chip (230) through the bumps (284) having no signal transmission function.** Therefore, Degani et al. do not teach the feature of the present invention that **a heat spreader without signal transmission functions is directly bonded onto the active surface of an IC chip of a silicon-on-silicon MCM tile.**

Degani et al., in Figs. 9-10, do not disclose the features of the present invention such as a silicon-on-silicon MCM tile consisted of stacked IC chips, and a heat spreader on the active surface of each of the stacked chips.

Therefore, Degani et al. do not anticipate claim 1, as amended, since Degani et al. do not teach each and every element of the claim, in Figs. 1-10. Consequently, Degani et al. do

not anticipate claims 2, and 5-8 dependent on claim 1 as a mater of law. With the same reason, Degani et al. do not anticipate claims 18 and 26. Consequently, Degani et al. do not anticipate claims 19-24 dependent on claim 18 as a mater of law.

Accordingly, Applicant respectfully submits that the ground of rejection has been addressed and the rejection has been overcome. Reconsider and withdrawal of the rejection are respectfully request.

Discussion of Rejections under 35 U.S.C. 103(a)

The Office Action rejects Claim 3, 4, and 25, insofar as claims 4 and 25 can be understood, under 35 U.S.C. 103(a) as being unpatentable over Degani et al. (US Patent No. 5,646,828) in view of Osedo (Japan Patent No. 3-187227A). Applicant respectfully traverses the rejections for at least the reasons set forth below.

Osedo discloses that Metal chips 5 whose dimensions are made to be uniform beforehand are bonded to the surfaces of the electrodes 3 of a semiconductor device (a semiconductor chip 5) to form bumps (see ABSTRACT: CONSTITUTION: Lines 1-5). Therefore, **the Metal chips (5) mean "bumps" for bonding between a semiconductor device and a package, but do not mean semiconductor devices (i.e. semiconductor chips 1) or the heat spreader of the claimed invention. More specifically, the metal chips (5) disclosed in**

Osedo are substantially equal to the bumps (282; Figs. 2-7) disclosed in the present invention.

Therefore, Degani et al. in view of Osedo do not reject claim 3, since the metal chips (5) disclosed by Osedo are substantially equal to the bumps (282, Figs. 2-7) disclosed by the present invention. Besides, Degani et al. in view of Osedo do not reject claims 4 and 25, since Osedo actually discloses that Au plating is applied to the bump (i.e. metal chip 5 in Osedo or bump 282 in the present invention) but not applied to a chip or a heat spreader in the present invention.

Accordingly, Applicant respectfully submits that the ground of rejection has been addressed and the rejection has been overcome. Reconsider and withdrawal of the rejection are respectfully request.

CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims 1-8 and 18-26 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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